

WHAT IS CLAIMED IS:

1. A method for phase sampling an incoming signal in a digital receiver, comprising:
downconverting the incoming signal to an Intermediate Frequency (IF) signal;
5 running a counter at a higher frequency than that of the Intermediate Frequency (IF) signal;
outputting a state of the counter when the IF signal has a zero crossing,
outputting a state of a magnitude of the IF signal when the IF signal has a zero crossing; and
extracting the phase of the IF signal from the outputted state of the counter and the outputted
state of the magnitude.
2. The method of claim 1, wherein the digital receiver is a Global Positioning System
(GPS) receiver.
3. The method of claim 2, wherein the phase extraction is performed by subtracting an
15 estimated phase from the extracted phase of the IF signal.
4. The method of claim 3, wherein the counter is running at a frequency that is an integer
multiple of the IF.
- 20 5. The method of claim 4, wherein the extracted phase of the IF signal is given by:
$$-2\pi J/M \text{ radians,}$$

where M is the integer multiple of the IF, and J is the outputted state of the counter.

6. The method of claim 5, wherein the state of the magnitude of the IF signal is a digital state.

7. The method of claim 6, wherein the digital state is at least two bits.

5

8. A method for phase sampling an incoming signal in a digital receiver, comprising:
downconverting the incoming signal to an Intermediate Frequency (IF) signal;
running a counter at a higher frequency than that of the Intermediate Frequency (IF) signal;
holding a state of the counter when the IF signal has a zero crossing;
holding a magnitude bit that is set to 1 if an absolute value of the real signal exceeded a
threshold prior to an occurrence of a previous zero crossing; and
extracting the phase of the IF signal from the state of the counter and the state of the
magnitude bit.